Reducing *Clostridium Difficile* Infections Among Long-Term Care Residents: A Collaborative in Kentucky

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NO DISCLOSURES

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• Kentucky Department for Public Health, Division of Epidemiology and Health Planning, Infectious Disease Branch, HAI Program

• Association of Linen Management Richmond, Kentucky – IP Consultant

Challenges: Changing Healthcare Delivery
CDC’s National 6 Winnable Battles

The CDC sets health priorities

Dr. Thomas R. Frieden, director of the Centers for Disease Control and Prevention, has set top national health priorities and strategies:

- **Infectious Diseases:** Reduce and control diseases such as HIV/AIDS, tuberculosis, and hepatitis.
- **STDs:** Reduce sexually transmitted disease rates through awareness and prevention.
- **Tobacco:** Reduce tobacco use and its negative health impacts.
- **Cancer:** Reduce cancer rates through early detection and prevention.
- **Motor Vehicle Injuries:** Lower deaths by supporting seatbelt laws, reducing speed limits, and improving traffic safety.
- **Healthy Eating and Physical Activity:** Improve nutrition and physical activity levels.

SOURCE: Centers for Disease Control and Prevention

Background LTC Setting

Long-term Care (LTC)

- **2012 - Long-term care 15,643 facilities with 1.4 million beds per CMS**

www.resonline.org/ltc_guides/maps
In 2012

- ~3 million residents received care in certified NH/SNF in the U.S.
  - For-profit nursing homes accounted for about 70.5% of the facility types
  - Non-profit nursing homes accounted for 23.2%
  - Government nursing homes accounted for the remaining 6.3%

Challenges: Changing Population in LTC

Nursing Home Compendium 2013, CMS

Overall decrease of 1.4% from 2008 to 2012

Percent of State Population 65 or Older Living in NHs

Kentucky: 2.8-3.3%
Percent of NH residents with 4 to 5 ADL Impairments

Kentucky: 65.5 to 79.4%

- Injurious Falls: 5.3-6.3%
- Pressure Ulcers: 5.1-5.8%
- Restrainted: 2.7-4.8%
- Incontinence: 36-43%
- Feeding Tube: 5.4-7.2%

Percent Distribution of Health Deficiency Citations

5% increase in “Greater than Minimal Harm”

Kentucky: 65.5 to 79.4%

Percent of NHs with Quality of Care Deficiencies by State 2012

Kentucky: 2.9-5.4%
25 percent of the nation’s facilities were cited for survey deficiencies for poor quality of care

- 34 percent for failure to meet professional standards;
- 30 percent for infection control problems;
- 29 percent for failure to provide comprehensive care plans;
- 24 percent for giving unnecessary drugs;
- 22 percent for poor clinical records;
- 21 percent for pressure ulcers;
- 21 percent for poor housekeeping


### U.S. NH IC Compliance by F-Tag

<table>
<thead>
<tr>
<th>Year</th>
<th>ESTABLISHES INFECTION CONTROL PROG (F441)</th>
<th>ISOLATES RESIDENTS WHEN APPROPRIATE (F442)</th>
<th>TREATS TEMP. RESIDENT (DIRECTLY contacts) (F443)</th>
<th>WASH HANDS WHEN INDICATED (F444)</th>
<th>HANDLES LINENS TO PREVENT SPREAD OF INFECTION (F445)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>2001</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
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<tr>
<td>2002</td>
<td>60%</td>
<td>70%</td>
<td>80%</td>
<td>90%</td>
<td>100%</td>
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<tr>
<td>2003</td>
<td>90%</td>
<td>100%</td>
<td>100%</td>
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<td>100%</td>
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<tr>
<td>2004</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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<tr>
<td>2005</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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<tr>
<td>2006</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2007</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
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<tr>
<td>2008</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2009</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2010</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Data courtesy of Ed Mortimer, CMS Survey & Cert., Nov. 2010

### Health and Human Services (HHS)

**News Release**

FOR IMMEDIATE RELEASE
Tuesday, January 6, 2009

Contact: HHS Press Office
(202) 260-2540

HHS Issues Action Plan to Prevent Health Care-Associated Infections

The U.S. Department of Health and Human Services (HHS) unveiled a five-year national prevention plan to reduce and possibly eliminate health care-associated infections (HCAIs). HCAIs are infections that patients acquire while undergoing medical treatment or surgical procedures. These infections are largely preventable.
• One of the major overarching priorities is:
  1. Progress towards 5-year national prevention targets

  - Central Line-associated Bloodstream Infections (CLABSI)
  - Clostridium difficile Infections (CDI)
  - Catheter-associated Urinary Tract Infections (CAUTI)
  - Methicillin-resistant Staphylococcus aureus (MRSA) Infections
  - Surgical Site Infections (SSI)
  - Ventilator-associated Pneumonia (VAP)

• Long-term Care will be added to Phase 3 of the Health and Human Services (HHS) Action Plan for the prevention of HAIs

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• Phase 3 for Long-term Care
  – **Priority Area 1**
    - Enrollment in NHSN for Nursing Home Infection Surveillance Activity
  – **Priority Area 2**
    - *Clostridium difficile Infection*, NH on-set reporting
  – **Priority Area 5**
    - Urinary Tract Infections, Catheter-Associated Urinary Tract Infections, and Catheter Care Processes reporting

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• *C. difficile* is a bacteria that lives in the intestinal tract of humans
• Surpassed MRSA as #1 organism causing HAIs
• Infection occurs when the bacteria over grows in the intestinal tract, as a result of loss of normal flora
• Symptoms of infection include:
  – Watery diarrhea
  – Abdominal cramps
  – Colitis
  – Sepsis
  – Death
C-Diff Annual Estimates

- Approximately 69% to 80% of reported CDIs occur in adults age 65 and older.

<table>
<thead>
<tr>
<th>Category</th>
<th># Cases</th>
<th>Excess costs</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital-onset</td>
<td>165K</td>
<td>$1.3 B</td>
<td>9,000</td>
</tr>
<tr>
<td>Community-onset, HCF-associated</td>
<td>50K</td>
<td>$0.3 B</td>
<td>3,000</td>
</tr>
<tr>
<td>Nursing home-onset</td>
<td>263K</td>
<td>$2.2 B</td>
<td>16,500</td>
</tr>
</tbody>
</table>

Why C. difficile in LTC?

- Increased risk for persons \( \geq 65 \) years
  - Age-related decrease in gastric acid
  - Residence in hospitals and LTC facilities
  - Overuse of Antimicrobial medications
  - Risk of cross contamination is substantial
    - High prevalence of incontinence
    - Shared bathroom, dining and rehabilitation facilities

Collaborative Study

- ACA - ELC funding in Sept 2011
- Kickoff Feb 2012 (18 month project)
  - 36 LTC facilities volunteered to participate
**Roger’s Diffusion of Innovation Theory**

People adopt change at different paces; some early, some late.

- Innovators: 2.5%
- Early majority: 13.5%
- Late majority: 34%
- Laggards: 34%

6 months or greater

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**Collaborative Facilities in Kentucky**

- 53% independent free-standing
- 47% for-profit
- 41% not-for-profit
- 12% government
- Avg. bed size 102
- Avg. LOS 285 days

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**Collaborative Facility IP Staff**

- Experience in Infection Control: median 3 years
- Educational level: < 9% with Bachelor’s degree or higher
- 0% certified in infection control (CIC)
- 73% spent 50% or less time on IP functions
- 48% received no training
Study Objective

• **Primary goal:** reduce the incidence of *Clostridium difficile* infections by 15%

• **Secondary goal:** reduce the use of antimicrobials for non-symptomatic bacteriuria by 25%

Antimicrobial use in NHs

• Antimicrobials are the most frequently prescribed drug class
  - Comprise 40% of all prescriptions
  - 50-70% of LTC residents will receive an antimicrobial during annually
  - 25-75% of antimicrobial use may be inappropriate

http://www.cdc.gov/DRUGRESISTANCE/healthcare/ltc.htm

Infections in LTC

Most common infections treated with antibiotics in nursing homes

- Urinary Tract Infection 32%
- Respiratory Tract Infection 20%
- Skin and Soft Tissue infection 12%
- Other 10%
- Undetermined 15%

Methods

• 18 month project –
  – February 2012 - July 2013
  – 6 months pre intervention data collection
  – 6 months post intervention data collection
  – Monthly conference calls and 4 in-person educational trainings

• NHSN LTC UTI and CDI Surveillance Definitions provided by Dr. Nimalie Stone, DQHP

SharePoint HAI Site

Methods

• Improvement Activities:
  • Surveillance methods (NHSN criteria)
  • Identification of symptomatic vs. non-symptomatic UTI events
  • Knowledge level of facility IP on transmission of disease and infection prevention and control practices
    – Environmental cleaning procedures
    – Use of Contact Precautions and PPE
    – Collection, storage, and transport of urine specimens
    – Urinary catheter use and care
Study Activities

- Intervention resources created
  - Polices
  - Monitoring tools
  - Algorithms and decision trees
  - Skills checklists
  - Teaching power point presentations
  - Case scenarios

Tools

(F) Environmental Cleaning and Disinfection
In the Long-Term Care Setting

Introduction: The environment must be recognized as a critical source of contamination that plays a significant role in the spread of infection. The accumulation of dust, soil, and microbes on environmental surfaces is aesthetically displeasing and can create a potential reservoir for microorganisms. Contact with contaminated surfaces, especially by hands and resident care equipment, can easily result in healthcare-associated infections (HAIs). Effective and efficient cleaning and disinfection methods and schedules are essential to maintain clean, safe, and healthy environments for residents in long-term care facilities. Yet there has been significant documentation of lack of compliance with established guidelines for disinfection and sterilization of all levels of care. Failure to comply with scientifically based guidelines has led to numerous outbreaks. When performed correctly, environmental cleaning and disinfection prevents the transmission of infectious pathogens to residents.

Tools
Study Results

- Analysis completed with SAS 9.3
- 18 facilities provided complete pre and post data collection
  - Lack of time and loss of staff most common reason for not collecting data
- Site visits made to validate data and SAS used to identify data errors

Tools Adopted for Implementation

21 facilities completed a post-intervention survey to determine which interventions were the most commonly adopted

<table>
<thead>
<tr>
<th>Intervention Description</th>
<th>Adoption Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTI and C-diff surveillance using NHSN criteria</td>
<td>20 95.24%</td>
</tr>
<tr>
<td>Charting to document urinary symptoms</td>
<td>19 90.48%</td>
</tr>
<tr>
<td>Use of bleach solution for CDI environmental cleaning</td>
<td>16 76.19%</td>
</tr>
<tr>
<td>Preferred use of ISO cath for urine specimen collection</td>
<td>16 76.19%</td>
</tr>
<tr>
<td>Use of isolation for MDRs</td>
<td>14 66.77%</td>
</tr>
<tr>
<td>Monitor staff hand-hygiene compliance</td>
<td>14 66.77%</td>
</tr>
<tr>
<td>Use of isolation for C-diff</td>
<td>13 61.90%</td>
</tr>
<tr>
<td>Use of urine specimen collection</td>
<td>12 57.14%</td>
</tr>
<tr>
<td>Use of disinfectant product on resident’s own furniture</td>
<td>10 57.14%</td>
</tr>
<tr>
<td>Use of UTI prevention algorithms</td>
<td>10 57.14%</td>
</tr>
<tr>
<td>Skills for inserting and removing urinary catheters</td>
<td>12 57.14%</td>
</tr>
<tr>
<td>Skills for changing and cleaning urinary drainage bag</td>
<td>12 57.14%</td>
</tr>
<tr>
<td>Provided ABX empiric therapy to medical providers</td>
<td>11 52.38%</td>
</tr>
<tr>
<td>Scheduled assessment of need for urinary catheters</td>
<td>11 52.38%</td>
</tr>
<tr>
<td>Improved urine specimen storage and transport</td>
<td>11 52.38%</td>
</tr>
<tr>
<td>Use of post-catheter assessment decision tree</td>
<td>10 47.62%</td>
</tr>
</tbody>
</table>
Results - UTI

- Urine Culture obtained = 84% of time (of the 16% with no culture, 55% had U/A)
- Specimen collection = 41% voided spec; 41% I&O cath; 8% indwelling

Results - UTI

- Top 3 organisms identified
  1. Escherichia Coli
  2. Proteus mirabilis
  3. Klebsiella pneumoniae

- Top 3 antibiotics prescribed
  1. Ciprofloxacin
  2. Nitrofurantoin (Macrobid/Macrodantin)
  3. Bactrim

  Avg. length of therapy = 9 days

Results - UTI

<table>
<thead>
<tr>
<th>UTI Surveillance Symptoms</th>
<th>Symptoms Reported, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ABUTI</td>
</tr>
<tr>
<td>Fever</td>
<td>75.00</td>
</tr>
<tr>
<td>Rigors</td>
<td>0.00</td>
</tr>
<tr>
<td>New onset hypotension</td>
<td>25.00</td>
</tr>
<tr>
<td>New onset confusion/functional decline</td>
<td>50.00</td>
</tr>
<tr>
<td>Acute pain, swelling, or tenderness of the testes, epididymis or prostate</td>
<td>0.00</td>
</tr>
<tr>
<td>Acute dysuria</td>
<td>0.00</td>
</tr>
<tr>
<td>Purulent drainage at catheter insertion site</td>
<td>0.00</td>
</tr>
<tr>
<td>None</td>
<td>0.00</td>
</tr>
</tbody>
</table>
## Results - UTI

<table>
<thead>
<tr>
<th>Symptoms reported (%)</th>
<th>NHSN</th>
<th>MD DX</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>16.39%</td>
<td>8.55%</td>
<td>&lt;0.0005</td>
</tr>
<tr>
<td>Rigors</td>
<td>0.82%</td>
<td>0.41%</td>
<td>0.603*</td>
</tr>
<tr>
<td>New onset hypotension</td>
<td>1.64%</td>
<td>1.22%</td>
<td>0.746*</td>
</tr>
<tr>
<td>Confused/Behavior Change</td>
<td>29.1%</td>
<td>24.56%</td>
<td>0.159</td>
</tr>
<tr>
<td>Acute pain swelling of testes</td>
<td>4.1%</td>
<td>0.54%</td>
<td>&lt;0.0003</td>
</tr>
<tr>
<td>Dysuria</td>
<td>54.92%</td>
<td>2.58%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Drainage - Catheter site</td>
<td>1.23%</td>
<td>0.68%</td>
<td>0.418*</td>
</tr>
<tr>
<td>No symptoms</td>
<td>17.21%</td>
<td>66.76%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

*P-value is the proportion of MD diagnosis cases vs. NHSN criteria cases
Chi-square or Fisher's exact test

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## Results - UTI

<table>
<thead>
<tr>
<th>UTI Surveillance Symptoms</th>
<th>New or Marked Increase, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ABUTI</td>
</tr>
<tr>
<td>Urgency</td>
<td>0.00</td>
</tr>
<tr>
<td>Frequency</td>
<td>0.00</td>
</tr>
<tr>
<td>Incontinence</td>
<td>0.00</td>
</tr>
<tr>
<td>Suprapubic tenderness</td>
<td>0.00</td>
</tr>
<tr>
<td>Gross hematuria</td>
<td>0.00</td>
</tr>
<tr>
<td>Costovertebral angle pain</td>
<td>0.00</td>
</tr>
<tr>
<td>None</td>
<td>100.00</td>
</tr>
</tbody>
</table>

---

## Results - UTI

<table>
<thead>
<tr>
<th>New or marked increase (%)</th>
<th>NHSN</th>
<th>MD DX</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urgency</td>
<td>25.41%</td>
<td>1.63%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Frequency</td>
<td>36.48%</td>
<td>5.67%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Incontinence</td>
<td>20.08%</td>
<td>3.53%</td>
<td>&lt;0.0001</td>
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<tr>
<td>Supra Pubic tenderness</td>
<td>32.79%</td>
<td>6.24%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Gross hematuria</td>
<td>5.74%</td>
<td>2.71%</td>
<td>0.0252</td>
</tr>
<tr>
<td>Costovertebral angle pain</td>
<td>15.16%</td>
<td>2.58%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>No symptoms</td>
<td>30.33%</td>
<td>82.50%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

*P-value is the proportion of MD diagnosis cases vs. NHSN criteria cases
Chi-square or Fisher's exact test
Results - UTI

**Goal was to see 25% Reduction**

### Pre-Intervention

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>UTI Transfer</th>
<th>Exposure Days</th>
<th>Hospitalization Rate</th>
<th>95% CI</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABUTI</td>
<td>2</td>
<td>351,405</td>
<td>0.57</td>
<td>0.10 - 1.88</td>
<td></td>
</tr>
<tr>
<td>CA-SUTI</td>
<td>5</td>
<td>15,496</td>
<td>2.27</td>
<td>1.12 - 71.52</td>
<td></td>
</tr>
<tr>
<td>SUTI</td>
<td>15</td>
<td>351,405</td>
<td>2.47</td>
<td>2.48 - 6.86</td>
<td></td>
</tr>
<tr>
<td>MD DX</td>
<td>56</td>
<td>351,405</td>
<td>15.94</td>
<td>12.15 - 20.54</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78 (8%)</strong></td>
<td><strong>351,405</strong></td>
<td><strong>22.20</strong></td>
<td><strong>17.66 - 27.55</strong></td>
<td><strong>0.93</strong></td>
</tr>
</tbody>
</table>

### Post-Intervention

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>UTI Transfer</th>
<th>Exposure Days</th>
<th>Hospitalization Rate</th>
<th>95% CI</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABUTI</td>
<td>0</td>
<td>246,758</td>
<td>0.00</td>
<td>*</td>
<td>0.35</td>
</tr>
<tr>
<td>CA-SUTI</td>
<td>1</td>
<td>9,809</td>
<td>0.19</td>
<td>0.51 - 50.28</td>
<td>0.31</td>
</tr>
<tr>
<td>SUTI</td>
<td>9</td>
<td>246,758</td>
<td>3.65</td>
<td>1.78 - 6.69</td>
<td>0.72</td>
</tr>
<tr>
<td>MD DX</td>
<td>40</td>
<td>246,758</td>
<td>16.21</td>
<td>11.74 - 21.86</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50 (10%)</strong></td>
<td><strong>246,758</strong></td>
<td><strong>20.26</strong></td>
<td><strong>15.20 - 26.00</strong></td>
<td><strong>0.62</strong></td>
</tr>
</tbody>
</table>

*For significance of the difference between pre and post-intervention rates: mid-P exact test

Rate per 100,000
### Results UTI Pre-Post Mortality – 30 days

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>UTI Deaths</th>
<th>Exposure Days</th>
<th>Mortality Rate</th>
<th>95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABUTI</td>
<td>1</td>
<td>351,405</td>
<td>0.00</td>
<td>0.01 - 1.40</td>
<td>0.50</td>
</tr>
<tr>
<td>CA-SUTI</td>
<td>1</td>
<td>9,809</td>
<td>10.19</td>
<td>0.51 - 50.28</td>
<td>0.78</td>
</tr>
<tr>
<td>SUTI</td>
<td>5</td>
<td>351,405</td>
<td>1.42</td>
<td>0.52 - 3.15</td>
<td>0.07</td>
</tr>
<tr>
<td>MD DX</td>
<td>29</td>
<td>351,405</td>
<td>5.63</td>
<td>3.70 - 7.97</td>
<td>0.19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8 (2%)</strong></td>
<td><strong>351,405</strong></td>
<td><strong>2.84</strong></td>
<td><strong>1.51 - 4.03</strong></td>
<td><strong>0.01</strong></td>
</tr>
</tbody>
</table>

*For significance of the difference between pre and post-intervention rates: mid-P exact test*

### Results - CDI

- Received antibiotic therapy in previous 30 days = 63.16%
- Placed in Contact precautions = 99%

### KV UC Collaborative Final Data Report

**CDI Rates by Month, Apr 2012-Jun 2013**

**Goal was 15% reduction**

*P value for the difference between average pre and post-intervention rates: 17% reduction, per 0.01*
### Results CDI Pre-Post Outcomes – 30 days

**Pre-Intervention**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Events</th>
<th>Exposure Days</th>
<th>Rate</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>0</td>
<td>351,405</td>
<td>0.00</td>
<td>--</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>6</td>
<td>351,405</td>
<td>1.71</td>
<td>0.69 - 3.55</td>
</tr>
</tbody>
</table>

**Post-Intervention**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Events</th>
<th>Exposure Days</th>
<th>Rate</th>
<th>95% CI</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>0</td>
<td>246,758</td>
<td>0.00</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>4</td>
<td>246,758</td>
<td>1.62</td>
<td>0.52 - 3.91</td>
<td>0.95</td>
</tr>
</tbody>
</table>

*For significance of the difference between pre and post-intervention rates: mid-P exact test. Rate per 100,000

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### Lessons

- Not enough time dedicated to IP function
- Assessment and documentation of UTI symptoms needed improving
- Confusion or behavioral change always meant UTI to staff
- LTC Staff communication can impact provider prescribing
- Urine specimen collection, storage, and transport an issue
- Environmental disinfection needed improving

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### Phase II

- Phase II of the Collaborative Sept 2013–July 2014
- 14 Facilities from phase 1 continued on
- Establish an antimicrobial stewardship committee - chaired by Facilities’ Medical Director
- Enroll in NHSN
- Add tracking of at least two MDROs
Antimicrobial Resistance

Total Number of New Antimicrobial Agents

1983-1987
1988-1992
1993-1997
1998-2002
2003-2007
2008-2012

ANTIBIOTIC DEVELOPMENT IS DWINDLING

Collaborative

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- Lynn Roser, PhDc, MSN

Kentucky Long-Term Care Collaborative Phase 2 Final Report
All Facilities (n=12)
MD Diagnosed UTI Rates by Month—Apr - Jun, 2014

59.8% reduction (p<0.001)